



DECLARATION

I, Hugh C. Gardner, residing at 2754 Long Lake Drive, Roswell, Georgia, make the following declaration:

1. I was awarded a Bachelor of Science degree in Chemistry from Rensselaer Polytechnic Institute in 1968, a Master of Science degree in Chemistry from Indiana University in 1970, and a Ph.D. degree in Chemistry from Indiana University in 1975.
2. I am currently, and since 1991 have been, employed by Amoco Fabrics and Fibers Company ("Amoco") of Austell, Georgia. Amoco makes and sells synthetic fibers and fabrics that are used as primary and secondary backings for carpets, and in construction and packaging applications. I am currently Manager of Product Development and have held that position since 2001. My responsibilities include supervising engineers, scientists, and process specialists who develop new products and provide technical support for all of Amoco's product lines. From 1991 until my current position I held positions as Research Associate and Manager of Technical Services, with direct and supervisory responsibilities related to new product development and technical support for Amoco's product lines. Before being employed by Amoco I was employed by Amoco Performance Products, Inc., of Alpharetta, Georgia, as Director of Advanced Composites Research and Development. In that position my responsibilities included supervising scientists and engineers who developed thermoplastic and thermoset composites for aircraft, aerospace, sporting goods, and ordnance applications.
3. I am a current member of several technical committees of the Carpet and Rug Institute, which is a leading trade association for the United States carpet industry, and of the Research Advisory Committee of the Georgia Textile Manufacturer's Association. I am, and for approximately thirty-five years have been, a member of the American Chemical Society.
4. I am a sole or joint inventor of about forty United States Patents in the fields of advanced thermoset composites and preregs, their components and applications, and synthetic fabrics for carpet backing and industrial applications.
5. I consider myself at least ordinarily skilled in technical fields related to synthetic carpet backings, carpets with synthetic backings, and their manufacture. I am making this declaration as one at least ordinarily skilled in those fields.
6. I am a co-inventor of United States Patent Application No. 09/696,519 (the "Application"). I have read a copy of an Office Action of the United States Patent and Trademark Office mailed May 27, 2004 (the "Office Action"), and understand

all claims of the Application have been rejected. I understand that U.S. Patent No. 3,684,600 of George E. Smedberg et al. entitled Hot Melt Carpet Backsizing Process (the "Smedberg Patent") is a basis for rejecting the claims.

7. I have read the Smedberg Patent. It describes a process, which it considers an improvement over hot melt adhesive carpet backsize processes, in which a pre-coat adhesive having a viscosity of 2-2000 cps is applied to a stitched or back side of a tufted carpet backing before application of a hot melt adhesive backsize composition.

8. Hot melt adhesive carpet backsize processes differ significantly from carpet lamination process using thermoplastic binders according to the Application. Important differences include the compositions of the binders, their viscosities at process temperatures and the manners in which they are used. Hot melt adhesive backsize compositions described in the Smedberg Patent and their use in the patent's process are substantially different from thermoplastic binders and their use according to the Application. Thermoplastic binders according to the Application are composed entirely or substantially of thermoplastic resin. They are described that way in the Application at page 12 and at page 57 line 31 to page 58 line 2. All of the Examples of the Application describe thermoplastic binders composed entirely or substantially of thermoplastic resins. In contrast, the hot melt adhesive carpet backsize compositions of the Smedberg Patent are particulate-filled, multi-component formulations with substantial amounts of components other than thermoplastic resins. In addition, unlike the 50,000-5,000 application viscosities at temperatures of 250-350° F according to the Smedberg Patent (which, as so stated, I understand to mean that viscosities decrease as temperatures increase within their stated ranges), thermoplastic binders according to the Application include binders, such as those in the form of fabrics, fibers and films that are applied in solid form. Other thermoplastic binders according to the Application, such as coatings, are applied in softened or melted form. Importantly, all thermoplastic binders according to the Application when heated to temperatures of 250-350°F have viscosities that are significantly greater than those of the hot melt back size compositions of the Smedberg Patent. Flow properties of preferred thermoplastic binder resins according to the Application at temperatures of about 100-150°C (212-302°F) correspond to MIs of about 2-150 g/10 min., as described at page 56 line 35 to page 57 line 11 of the Application. The Smedberg Patent is unclear about how the viscosities of its hot melt adhesive backsize compositions are measured, but on information and belief, the melt viscosities of the thermoplastic binder resins of the Application at comparable temperatures are at least an order of magnitude greater than the viscosities described in the Smedberg Patent. They also are too high for the thermoplastic binders of the Application to be applied with the weight and uniformity needed for carpet manufacture using the adhesive reservoir-applicator roll-doctor blade system described in the Smedberg Patent. I am aware that the Smedberg Patent, at Col. 3 lines 37-41, includes a statement that its hot melt

adhesive backsize composition may be applied by means other than applicator rolls so long as sufficient amounts are deposited onto a carpet backsize. I understand those other means would need to be useful for effectively applying liquids with the low viscosities of the Smedberg Patent's hot melt adhesive backsizes and do not consider it relevant to application of solid or more viscous materials such as thermoplastic binders according to the Application.

9. I understand from the Office Action that the Smedberg Patent is considered to suggest a backsize composition comprising polyethylene or comprising only polyethylene. At page 12 the Office Action states as follows, quoting the Smedberg Patent with added emphasis:

"A variety of hot melt adhesives are useful as the backsizing composition in the present process. **While such adhesives can consist solely of a polymeric binder resin, such as an ethylene/vinyl acetate copolymer,** for economic reasons they generally include substantial quantities of other ingredients. Thus, in addition to a polymeric binder resin, useful adhesive compositions generally contain at least one of the following ingredients: waxes, fillers, and resin extenders. **Also, in addition to or in place of ethylene/vinyl acetate resins other types of binder resins such as polyethylenes** and ethylene/acrylate or methacrylate copolymers **can be used.**' (Emphasis added see Column 6 lines 66-75 and Column 7, lines 1-3). Thus, clearly Smedberg teaches the use of a backsizing composition comprising polyethylene."

At page 13, the Office Action also concludes as follows:

"As shown above, Smedberg does not require viscosity depressing wax and low softening point resin extender components. Smedberg suggests the use of a thermoplastic binder comprising only polyethylene."

10. I disagree with the understanding and interpretation of the Smedberg Patent in the Office Action, and particularly with the understanding and interpretation at pages 12 and 13. A hot melt adhesive composed only of polyethylene would not be a suitable backsize composition according to the Smedberg Patent because the application viscosities according to the Smedberg Patent -- 50,000 to 5,000 cps at 250-350° F -- would require a low molecular weight polyethylene polymer or oligomer with inadequate strength and adhesion as a carpet backsize. It also would lack the melt flow properties of thermoplastic binder resins according to the Application and would be too brittle when solid for effective bonding of carpets. A hot melt adhesive composition containing a polyethylene with adequate strength as a carpet backsize would have a much higher viscosity than described in the Smedberg Patent, would need to be formulated with wax or other viscosity-lowering materials to attain the Smedberg

Patent's viscosities, and would not be a thermoplastic binder composed entirely or essentially of thermoplastic resin according to the Application.

11. I understand that hot melt adhesive carpet backsize compositions are generally formulated from basic components that include (1) copolymers of ethylene with low molecular weight carboxylic acids or carboxylic acid esters with good adhesive properties, such as ethylene-vinyl acetate, -acrylate or -methacrylate copolymers, (2) waxes that are low viscosity liquid carriers for the copolymer component at application temperatures and impart suitable application viscosities to formulations for use in the hot melt backsize process, but are relatively hard solids at room temperature, and (3) powdered calcium carbonate or another inert, inorganic particulate filler for imparting weight and adjusting application viscosities of the formulations. I understand the compositions sometimes also include additional ingredients such as antioxidants, other thermoplastic resins, low melting or softening point polymers, or resin modifiers and extenders.

12. My understandings in paragraphs 10 and 11 above are consistent with the Smedberg Patent's overall description of hot melt adhesive carpet backsize compositions, which I understand includes not only the list of possible ingredients in the passage of the Office Action quoted above, but also the description of ingredients, formulations and characteristics at Col. 7 lines 4-55 and Col. 8 lines 33-49 of the patent. Hot melt adhesive carpet backsize compositions described in the Smedberg Patent contain 15-35 wt.% ethylene-vinyl ester, -acrylate or -methacrylate copolymers, 10-25 wt.% microcrystalline or other high melting point wax, 50-70 wt.% of a blend of aliphatic thermoplastic hydrocarbon resin and dicyclopentadiene alkylation polymer, and up to about 45 wt.% inorganic filler such as calcium carbonate, as described at Col. 7 lines 4-28. A specific formulation of these components, described in connection with the examples of the Smedberg Patent at Col. 8 lines 33-49, contains only 15 wt% ethylene-vinyl acetate copolymer, with the remaining 85 wt% being made up of calcium carbonate filler, waxes and low softening point polymers.

13. I am also familiar with US Patent No. 3,551,231 of George E. Smedberg, which is referred to in regard to hot melt adhesive carpet backsize processes at Col. 2 lines 22-41 of the Smedberg Patent. The patent lists ingredients of its hot melt adhesive carpet backsizes as follows, using language similar to that of the Smedberg Patent quoted in the Office Action, except polyethylene is mentioned in addition to, but not in place of, ethylene/vinyl acetate copolymers.

"A variety of hot melt adhesive compositions are useful in practicing the process of the present invention. While such adhesives can consist solely of a polymeric binder resin, such as an ethylene/vinyl acetate copolymer, for economic reasons they generally include substantial quantities of other ingredients. Thus, in addition to a polymeric binder resin, useful adhesive compositions generally contain at least one of the following ingredients:

waxes, fillers, and resin extenders. Also, in addition to ethylene/vinyl acetate resins other types of resins such as polyethylenes and ethylene/acrylate or methacrylate copolymers can be used." (Emphasis added.)

At Col. 4 lines 3-7, the patent describes application viscosities of 8,000 to 15,000 cps for hot melt adhesive backsize compositions for most common commercial carpet applications and, in Table I, reports an application viscosity of 10,000 cps at 320°F for a hot melt adhesive backsize composition, which, as described at Col. 5 lines 32-46, is the same or almost the same as the hot melt adhesive backsize composition with 15 wt% ethylene-vinyl acetate reported in the Smedberg Patent's examples at Col. 8 lines 33-49. US Patent No. 3,551,231 is inconsistent with the Office Action's interpretation of the Smedberg Patent as teaching that a hot melt carpet backsize adhesive containing only or primarily polyethylene would be useful as a carpet backsize. It is consistent with my understanding that there are fundamental differences between the compositions and viscosities of thermoplastic binders according to the Application and those of the Smedberg Patent's hot melt adhesive backsizes.

14. I also am familiar with US Patent No. 3,583,936, which is referred to Col. 7 lines 4-9 of the Smedberg Patent for its description of "particularly preferred compositions" for its hot melt adhesive carpet backsize compositions. Col. 3 line 42 – Col. 4 line 52 of the patent describe "essential ingredients" of the composition as ethylene copolymers with vinyl esters of lower carboxylic acids, a wax with a suitably high melting point and a resin extender that is a blend of a base resin and a modifying resin. The importance of proportional amounts of those components is described at Col. 4 line 70 – Col. 5 line 15, stating that application temperature viscosities of the adhesive are too high at ethylene copolymer contents above 35 wt.% and that application viscosities increase with less than 50-70 wt.% resin extender component. According to the patent, at Col. 1 lines 65-71, hot melt adhesive backsize compositions are generally applied at temperatures of 220-340°F and "a desirable adhesive composition should have a Brookfield viscosity (spindle #7; 50 rpm) of about 1,000 centipoises – 15,000 centipoises within the aforementioned temperature range." US Patent No. 3,583,936 is consistent with my understanding that there are fundamental differences between the compositions and viscosities of thermoplastic binders according to the Application and those of hot melt adhesive carpet backsizes of the Smedberg Patent. Its teachings of essential hot melt adhesive components and proportions contradict the Office Action's interpretation of the Smedberg Patent as teaching hot melt adhesive compositions useful as carpet backsizes that are composed entirely or substantially of polyethylene.

15. I also am familiar with US Patent No. 3,745,054 of George E. Smedberg. The patent, at Col. 2 lines 25-44, Col. 3 line 1 – Col. 4 line 45 and in its examples, describes hot melt adhesive carpet backsize compositions formulated from ethylene/lower vinyl ester copolymers, waxes, low softening point resin extender blends and inorganic fillers. The patent specifically teaches, at Col. 2

lines 25-47, that hot melt backsize application viscosities of 10,000 to 15,000 at 310°F are optimum for carpet manufacture. Referring to the compositions of U.S. 3,583,936, which are the Smedberg Patent's particularly preferred compositions, the patent teaches that a 310°F application viscosity of 49,000 cps is "excessively high." Table 1 of the patent shows viscosities of 5,680 to 35,200 cps at 250-350 °F for hot melt adhesive backsize compositions that are the same or substantially the same as the 15 wt.% ethylene-vinyl acetate copolymer of the Smedberg Patent's examples except that percentages of their resin extender components are reversed. US Patent No. 3,745,054 also is consistent with my understanding that there are fundamental differences between the compositions and viscosities of thermoplastic binders according to the Application and of the hot melt adhesive carpet backsize of the Smedberg Patent. It is inconsistent with the Office Action's interpretation of the Smedberg Patent regarding polyethylene as the sole component of hot melt adhesive compositions useful as carpet backsize.

16. Samples of the thermoplastic resins of the thermoplastic binders in Examples 1 and 3-40 of the Application were provided to a certified, independent testing laboratory, Plastics Technology Laboratories located at Pittsfield, Massachusetts, for testing their viscosities. At my request, testing of the samples was conducted at temperatures from 250°F to 310°F. The samples were tested by capillary rheometry according to the procedure of ASTM D-3835-02. That procedure is commonly used for measuring viscosities of thermoplastic resins but is not routinely used for hot melt backsize compositions of the type described in the Smedberg Patent because they are too runny for reliable measurements and test results. Viscosity data for the thermoplastic binder resins of the Application's examples measured at a shear rate of 97 reciprocal seconds (sec^{-1}) are reported in the Table below because that shear rate is closest to the shear rate used in the Brookfield viscosity test referred to in US Patent No. 3,583,936, which is cited in the Smedberg Patent as discussed in paragraph 14 above and, among the Smedberg Patent and the other hot melt adhesive carpet backsize patents it cites, the only patent providing details about the Brookfield viscosity test procedure. On information and belief, and in view of the Smedberg Patent and the other hot melt adhesive carpet backsize patents it cites all showing the same assignee and their same or substantially the same hot melt adhesive backsize compositions and application temperatures and consistent viscosity data, the viscosity data in the Smedberg Patent and those other patents were generated using the same Brookfield procedure. Viscosity data obtained for the thermoplastic binder resins of Examples 1 and 3-40 of the Application and Brookfield viscosity data reported in the Smedberg Patent and the patents discussed in paragraphs 13, 14 and 15 above are shown in the following tables.

Viscosity Data Reported in US 3,684,600, 3,551,231, 3,583,936 and 3,745,054

Source	Viscosity (cps) at temperature of:				
	250°F	270°F	290°F	310°F	330°F
Smedberg Patent	50,000 – 5,000				
U.S. 3,551,231 Most common commercial carpet applications	8,000 – 15,000				
Table I				10,000 at 320°F	
U.S. 3,583,936	1,000 – 15,000 at 220-340 °F				
U.S. 3,745,054 Table I Optimum "Excessively viscous"	35,200	24,680	17,440	11,800 10,000 - 15,000 49,000	8,200

Viscosity Data for Thermoplastic Binder Resins

Source	Viscosity (cps) at temperature of:				
	250°F	270°F	290°F	310°F	330°F
Thermoplastic binder of Ex. 1, 3-16, 19-36, 38-40: MI 27 polyethylene	Solid – not melted or softened	521,500	430,000	367,200	---
Thermoplastic binder of Ex. 17, 18, 37: MI 105 polyethylene	Solid – not melted or softened	215,000	175,900	139,100	---

17. On information and belief as one at least ordinarily skilled in the synthetic carpet industry, the viscosity data in the tables in paragraph 16 confirm that at the temperatures shown, the thermoplastic binders according to the Application

are substantially more viscous than the hot melt adhesive carpet backsize compositions described in the patents identified in the table, and that the thermoplastic binders consisting entirely or essentially of the thermoplastic resins according to the Application are significantly different from hot melt adhesive carpet backsize compositions as described in the Smedberg Patent.

18. As one at least ordinarily skilled in the synthetic carpet backing industry, at the time the Application was filed, I was surprised by the improvements in fuzz resistance, often with accompanying improvements in tuft bind, in carpets containing or made using the low levels of organic polymer component and thermoplastic binders according to the Application. Those results were surprising and unexpected to me. From my understanding of the Smedberg Patent and the other patents referred to in this Declaration, I could not have predicted and would not have expected the improvements attained according to the Application.

19. I hereby declare that all statements made in this Declaration of my own knowledge are true and that all statements made on information and belief are believed by me to be true, and further that these statements are and were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 USC 1001 and that such willful false statements may jeopardize the validity of the patent application here under consideration and any patent issued thereon.

Hugh C Gardner
Hugh C. Gardner

Date: 22 November 2004

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